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(11) (A) No.

1 269 683

(45) ISSUED 900529

(52) CLASS 285-47.4

(51) INT. CL. <sup>4</sup> F16L 37/00, 37/08

(19) (CA) **CANADIAN PATENT** (12)

(54) Quick-Connector for Diss Gas Couplings

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(21) APPLICATION No. 469,107

(22) FILED 841130

No. OF CLAIMS 11

**Canada**

469107

ABSTRACT OF THE DISCLOSURE

A coupling includes a male member with a grooved configuration at opposed locations, and a hollow female member adapted to receive the male member. The female member has a side wall with slots at opposed locations.

- 5 A cam member exterior of the female member can rotate with respect to the female member. The cam member has recesses which contain a generally U-shaped spring that includes a base and two arms. The arms lie in slots of the female member when the cam member is in a first
- 10 rotational position with respect to the female member, such that the arms protrude into the interior of the female member sufficiently to engage the grooved configuration of the male member. The cam member is rotatable to a second position with respect to the
- 15 female member, in which the recesses of the cam member and the slots of the female member are out of registry, so that the arms of the spring are forced apart sufficiently to allow removal of the male member. The grooved configuration of the male member is adapted to
- 20 receive the arms when the cam member is in the first position, thus retaining the male member within the female member.

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QUICK-CONNECTOR FOR DISS GAS COUPLINGS

This invention relates generally to connector assemblies, and while it has particular application to gas connector assemblies utilized in hospitals and the like for dispensing various medical gases, it will be appreciated from what follows that the structure utilized can be employed with advantage in any situation where a male member connects into a female member.

10 BACKGROUND OF THIS INVENTION

In the field of medical gas connector assemblies like those utilized in hospitals for dispensing medical gases such as nitrous oxide, nitrogen, oxygen, etc., it is clear that it would be of considerable advantage to have a rapidly attachable connector device. This is particularly true in case of emergencies, where oxygen or other medical gas may have to be administered very quickly.

While there are quick-connection joints already known in the mechanical field, specifically the bayonet joint, there are certain inherent disadvantages to the bayonet construction which is an object of the present invention to overcome.

Firstly, the bayonet joint requires the user to correctly align the male and female portions, and this requires a careful inspection of the parts to ensure that the initial introduction of the male member will be accomplished in the correct orientation. Secondly, after insertion of the male member, the user must rotate the male member in the correct direction in order to engage the bayonet joint. In an emergency situation, it is obvious that the less the user is concerned about the mechanics of engaging the coupling, the better. Ideally, the user should be able to simply shove the male member into the female member, and accomplish a snap engagement.



GENERAL DESCRIPTION OF THIS INVENTION

In view of the foregoing disadvantages of the prior art, it is an aim of one aspect of this invention to provide a quick-connect assembly with which the user need not be concerned about rotational direction or  
5 orientation.

It is an aim of another aspect of this invention to provide a quick-connecting coupler assembly which may be used with advantage in the dispensing of medical and other gases for hospitals and the like, and which  
10 has a reliable and inexpensive construction.

More particularly, this invention provides a coupling comprising:

a male member having a grooved configuration at least at substantially opposed locations on the male  
15 member,

a hollow female member adapted to receive the male member, the female member having a side wall which has slots at substantially opposed locations,

a cam member mounted exteriorly of the female  
20 member for rotation with respect thereto, the cam member having recess means containing a generally U-shaped spring having a base portion and two arms, the arms lying in the slots of the female member when the cam member is in a first rotational position with  
25 respect to the female member, such that the arms protrude into the interior of the female member sufficiently to engage the grooved configuration of the male member, the cam member being rotatable to a second position with respect to the female member, in which  
30 the recess means and the slots are out of registry such that the arms of the spring are forced apart sufficiently to allow removal of the male member, the grooved configuration of the male member being adapted to receive said arms when the cam member is in said  
35 first position, thereby to retain the male member within the female member.

GENERAL DESCRIPTION OF THE DRAWINGS

One embodiment of this invention is illustrated in the accompanying drawings, in which like numerals

denote like parts throughout the several views, and in which:

Figure 1 is a perspective view of a coupling constructed in accordance with this invention;

Figure 2 is an elevational view of the coupling members in engagement with each other; and

Figure 3 is an axial sectional view of the members in engagement.

#### DETAILED DESCRIPTION OF THE DRAWINGS

Attention is first directed to Figure 1, which shows a coupling 10 which includes a male member 12 and a female member 14. The male member has a nose portion 16 at its forward end, and a helical thread 18 adjacent the nose portion. The helical thread 18 is not utilized in this quick-connect coupling, but it allows use of the conventional DISS female member, when desired. A frusto-conical camming surface 20 is adjacent the threads 18, and a main cylindrical portion 22 is adjacent the camming surface 20. The cylindrical portion 22 has a grooved configuration adjacent the camming surface 20. More specifically, the grooved configuration includes two separate grooves 24 at substantially opposed locations on the male member 12 (only one groove 24 being visible in Figure 1).

Projecting radially outwardly from the cylindrical portion 22 is a pin 26, the purpose of which will become apparent from what follows.

Turning now to the female member 14, this member has a substantially cylindrical rearward portion 28 which includes a side wall having slots 30 at substantially opposed locations adjacent the rearward end 32 of the female member 14.

The female member has a portion 34 of reduced diameter forwardly of the rearward part just described, a frusto-conical portion 36 forwardly of the portion 34, and a connector portion 38 forwardly of the frusto-conical portion 36.

Internally, the female member 14 has a forward bore portion 40, which expands into a portion 42 of larger diameter rearwardly of the bore portion 40, the

portion 42 in turn expanding to a portion 44 of larger diameter, which then steps at 46 to the diameter of the side wall 28.

Slidably located within the stepped bore of the female member 14 is a nipple member 49 having a seating  
5 end 50, an annular flange 52, and an internal bore 54.

Between the annular flange 52 and an annular wall 54a constituting the step between the portions 42 and 44 of the internal bore of the female member 14, is a free annulus 56 which separates two annular springs 55.

10 It will thus be seen that the nipple member 49 is biased forwardly by the springs 55. An O-ring seal 58 seals the forward end of the nipple member 49 against the bore portion 42 within the female member 14. A C-clip 59 locks the annular flange 52 forwardly of the  
15 position of the C-clip, thus retaining the nipple member 49 in the position shown in Figure 1, and preventing its removal.

The coupling shown in Figure 1 further includes a cam member 61 which is mounted exteriorly of the female  
20 member 14 and is able to rotate with respect thereto. The cam member 61 has a hexagonal outer configuration, and is retained longitudinally in position with respect to the female member 14 at one end by an outwardly projecting flange 63 on the female member 14 which  
25 engages an annular recess 64 on the cam member 61 (see Figure 3), and at the other end by a retaining C-clip 65 which engages in a groove 66 on the exterior of the female member 14.

The cam member 61 has recess means which contains  
30 a generally U-shaped spring 68 which includes a base portion 70, and two arms 72. More specifically, the cam member 61 has a groove 75 along one of the hexagonal facets (the one appearing at the top in Figure 1 and at the bottom in Figure 3), and has  
35 slot-like openings 77 which open through locations diametrically opposed to each other along a diameter passing through the opposite hexagonal apices which are not adjacent the hexagonal face into which the groove 75 is cut.

This configuration is best seen in Figure 4, and it will be further seen in this figure that the recess means of the cam member 61 permits the arms 72 of the U-shaped spring 68 to enter through the slots 30 of the female member, and to extend into the interior of the hollow female member 14 to such an extent that they would have mechanical interference with the cylindrical portion 22 of the male member 12, were it not for the grooves 24 in the latter member.

It will of course be appreciated that the entry of the arms 72 into the grooves 24 of the male member 12 can only take place when the male member 12, the female member 14 and the cam member 61 are in the positions which are shown in Figure 4. However, by rotating the cam member 61 with respect to the female member 14, the arms 72 are also carried around with the cam member 61 and engage the female member 14 in such a way that they are pried apart and thus disengage from the grooves 24 of the male member 12.

In the embodiment illustrated in the drawings, the pin 26 of the male member 12 engages with a longitudinal groove 79 at the rearward end 32 of the female member 14. This engagement of the pin 26 and the groove 79 is provided to ensure that the user will readily insert the male member in the proper orientation with respect to the female member 14, to allow the arms 72 to engage in the grooves 24.

In a possible alternative embodiment, the grooves 24 of the male member 12 could be replaced by an annular groove running all the way around the cylindrical portion 22, and the pin 26 and groove 79 could then be dispensed with. This would mean that the male member 12 could be engaged with the female member 14 in any mutual angular orientation. Disengagement would again take place by rotating the cam member 61.

To facilitate rotation of the cam member 61, the embodiment illustrated in the drawings provides a hand grip 81 having a frusto-conical ribbed outer configuration 83 adjacent a smooth cylindrical

configuration 84, and having a hexagonal interior recess which snugly fits over the outer hexagonal configuration of the cam member 61. Thus, rotation of the hand grip 81 causes like rotation of the cam member 61.

5       When the coupling disclosed herein is applied to gas-specific configurations of the kind normally used in the dispensing of medical gases within hospitals and the like, the outer diameter of the nipple is made to be gas specific in size, and closely fits into an  
10   internal bore 84 of the male member 12. Also in such application, the internal bore 84 of the male member 12 would contain a seat 86 against which the nipple can seal when the members 12 and 14 are coupled together, the seat 86 being part of the slidable valve member  
15   (shown in broken lines at 88) which is within the internal bore 84, the valve member 88 being adapted to be opened by being moved away from the male member through contact with the nipple 49, according to a known construction.

20       It will thus be appreciated that in the illustrated embodiment, the male member 12 can be inserted quickly and accurately into the female member 14 without requiring anything other than longitudinal pushing force, so long as the pin 26 is aligned with  
25   the groove 79. The camming surface 20 simply cams the arms 72 of the spring out of the way, and when the grooves 24 come into registry with the slots 30, the arms 72 snap into the grooves 24 and thus retain the male member 12 in place. To release the coupling, the  
30   hand grip 81 is rotated with respect to the female member 14, upon which the two members can be disengaged.

      In the normal use of this coupling in gas-specific medical applications, the female member would be  
35   connected to the gas-using apparatus, and the male member would be secured to a wall mounted plate, typically along with other outlets for different medical gases. Those skilled in the art will appreciate that the gas-specific arrangement typically

referred to as DISS can readily be adapted to the coupling described herein.

It will also be appreciated that the present coupling arrangement is such that the quick-disconnect can be accomplished without rotation of any equipment  
5 attached to either the male or the female member.

While a specific embodiment of this invention has been illustrated in the accompanying drawings and described hereinabove, it will be apparent to those skilled in the art that changes and modifications may  
10 be made therein without departing from the essence of this invention as set forth in the appended claims.

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A coupling comprising:

a male member having a grooved configuration at substantially opposed locations on the male member,

a hollow female member adapted to receive the male member, the female member having a side wall which has slots at substantially opposed locations,

a cam member mounted exteriorly of the female member for rotation with respect thereto, the cam member having recess means containing a generally U-shaped spring having a base portion and two arms, the arms lying in the slots of the female member when the cam member is in a first rotational position with respect to the female member, such that the arms protrude into the interior of the female member sufficiently to engage the grooved configuration of the male member, the cam member being rotatable to a second position with respect to the female member, in which the recess means and the slots are out of registry such that the arms of the spring are forced apart sufficiently to allow removal of the male member, the grooved configuration of the male member being adapted to receive said arms when the cam member is in said first position, thereby to retain the male member within the female member.

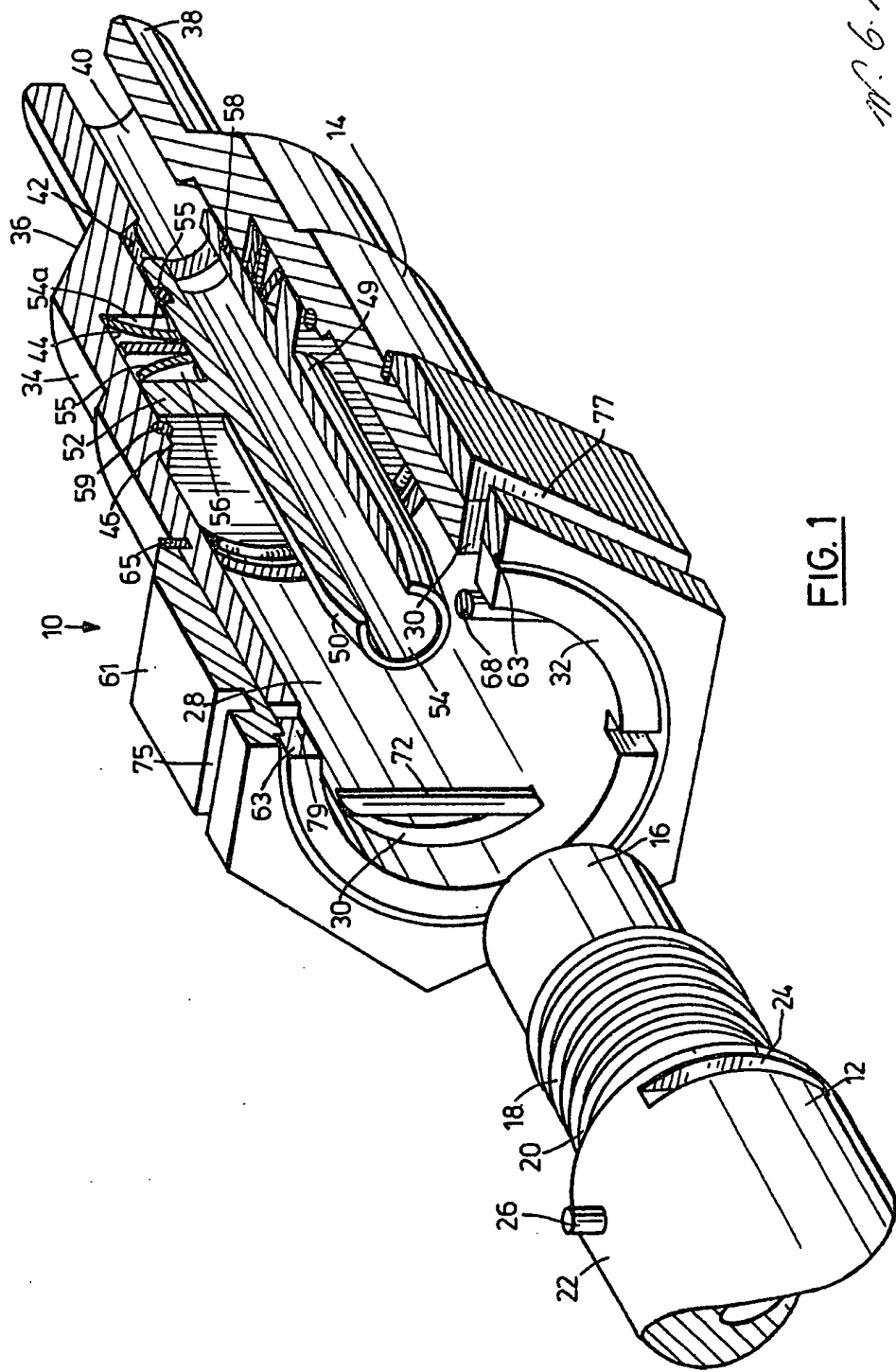
2. The coupling claimed in claim 1, in which the grooved configuration includes two separate grooves at substantially opposed locations on the male member, the coupling further having means to restrain the male and female members from relative rotation while permitting relative longitudinal movement between them.

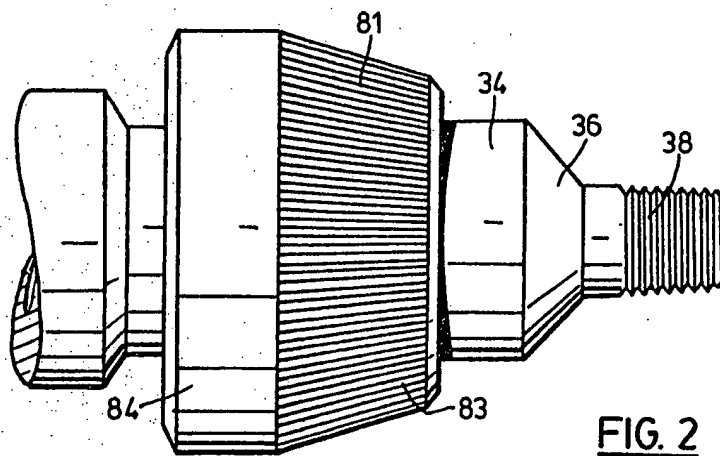
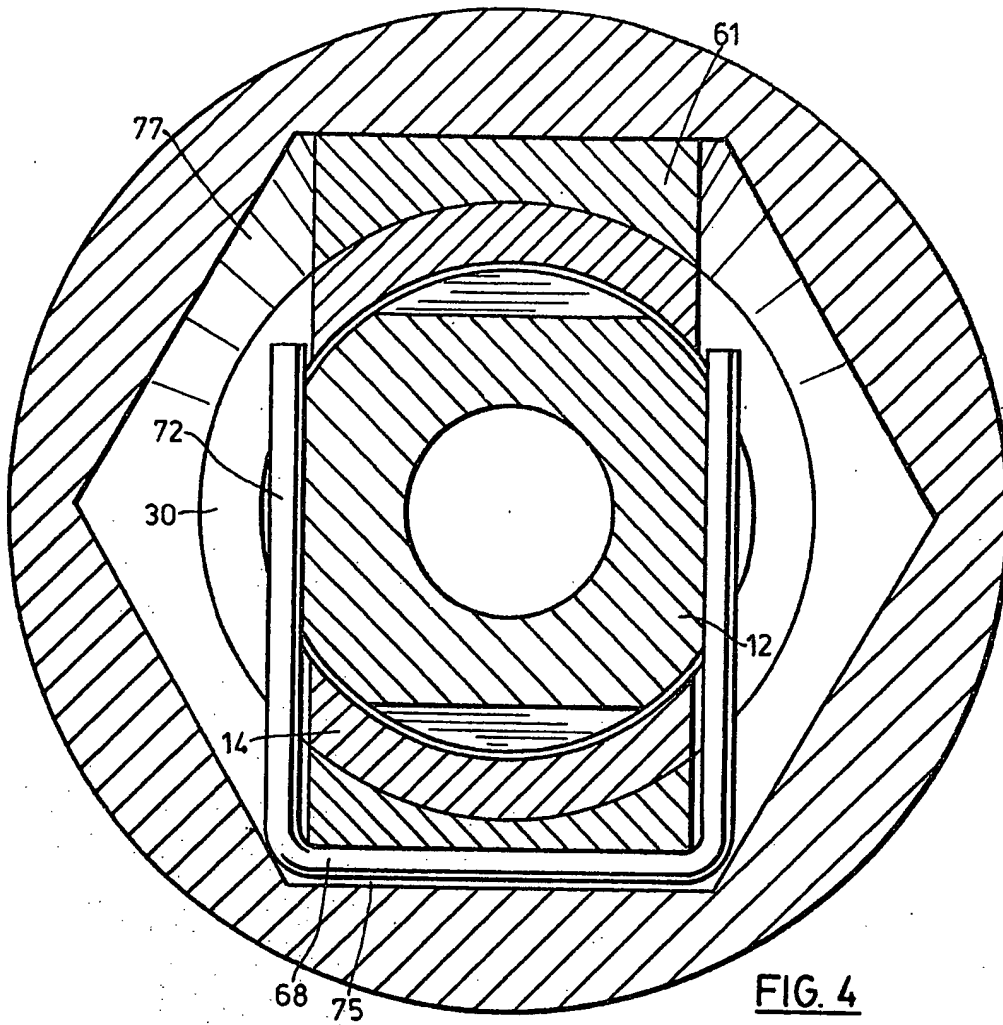
3. The coupling claimed in claim 2, in which the male member and the female member are both cylindrical, and in which said means is a pin on one of said male and female members which registers in a longitudinal groove in the other of said male and female members.

4. The coupling claimed in claim 3, in which the cam member has a cylindrical inner surface surrounding the female member.
5. The coupling claimed in claim 4, in which the cam member has a hexagonal outer configuration into which said recess means penetrates.
6. The coupling claimed in claim 5, further including a hand grip enclosing the cam member complementally, whereby the cam member can be rotated by rotating the hand grip.
7. The coupling claimed in claim 6, in which said pin projects radially outwardly from, and is fixed to, the male member.
8. The coupling claimed in claim 1, in which the base portion and arms of the spring are all substantially rectilinear, with each arm being perpendicular to the base portion when the spring is unstressed.
9. The coupling claimed in claim 1, in which the female member contains a gas-specific nipple which is spring-biased toward the end into which the male member is inserted, and in which the male member has an internal bore with a gas-specific internal diameter for receiving the nipple, the internal bore containing a seat against which the nipple can seal when the male and female members are coupled together.
10. The coupling claimed in claim 9, in which the seat is part of a slidable valve member within said internal bore, the valve member being opened by being moved away from the male member by contact with the nipple.
11. The coupling claimed in claim 1, in which the male member has a frusto-conical camming surface adjacent said grooved configuration to cam the arms of the spring apart upon insertion of the male member.



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